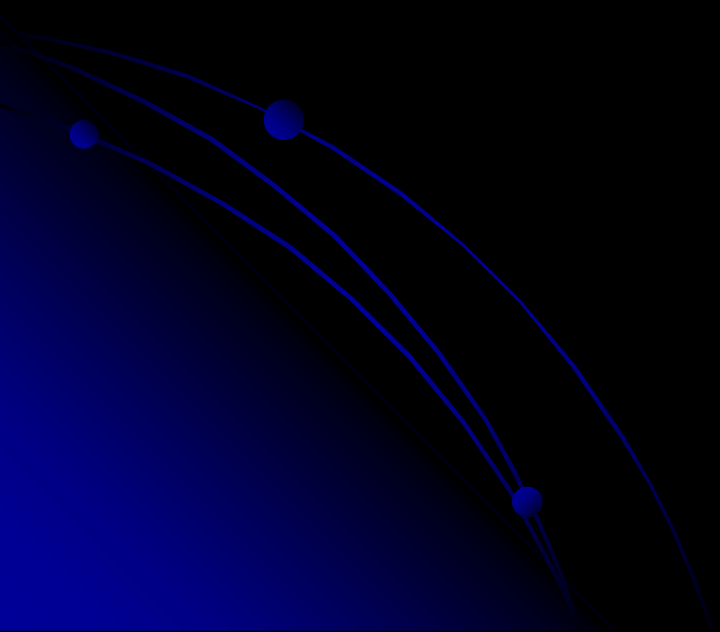
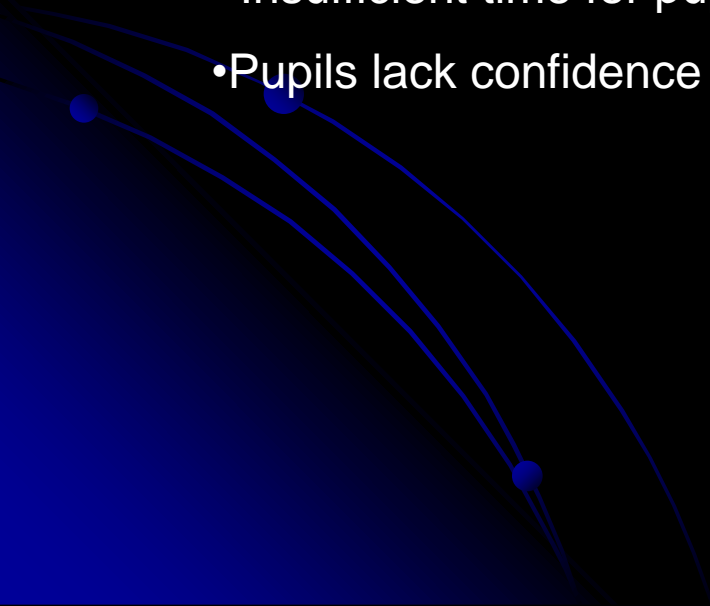


Teaching and learning – the journey



Weaknesses in conventional teaching approaches

- Too much teacher explanation
 - Closed questions dominate
 - Tasks are unclear
 - Insufficient attention on developing a secure understanding
 - Too much repetition of work
 - Pupils are insufficiently aware of the goals for the teaching unit
 - Pupils are mainly receivers of information
 - Insufficient time for pupils to develop their understanding
 - Pupils lack confidence - they feel they will not achieve their goal
- 

Consequences

Passive learners

Over-dependence on the teacher

Limited personal involvement in their own learning and progress.



Passive view

A given body of knowledge and standard procedures that has to be 'covered'

An individual activity based on watching, listening and imitating so fluency is attained

Structuring a linear curriculum for learners
Giving explanations before problems.
Checking that these have been understood through practice exercises
Correcting misunderstandings

Mathematics is...

Learning is...

Teaching is...

Connected view

An interconnected body of ideas and reasoning processes

A collaborative activity in which learners are challenged and arrive at understanding through discussion

Exploring meaning and connections through non-linear dialogue between teachers and learners

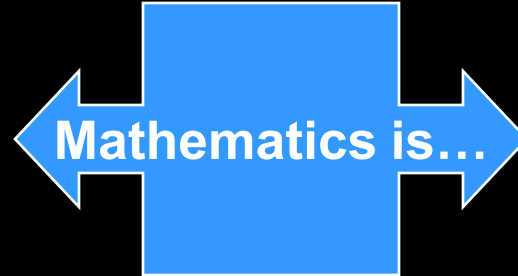
Presenting problems before offering explanations

Making misunderstandings explicit and learning from them

Passive view

Connected view

*MATHS IS
DONE TO
THE
STUDENTS*



*MATHS IS
DONE BY
THE
STUDENTS*

Principles for effective teaching

- Build on knowledge learners bring to the session
- Expose and discuss common misconceptions
- Develop effective questioning
- Use cooperative small group work
- Emphasise methods rather than answers
- **Use rich collaborative tasks**
- Create connections between mathematical topics
- Use technology in appropriate ways

- *What kind of mathematical thinking did they engage in?*

- *What did they talk about?*

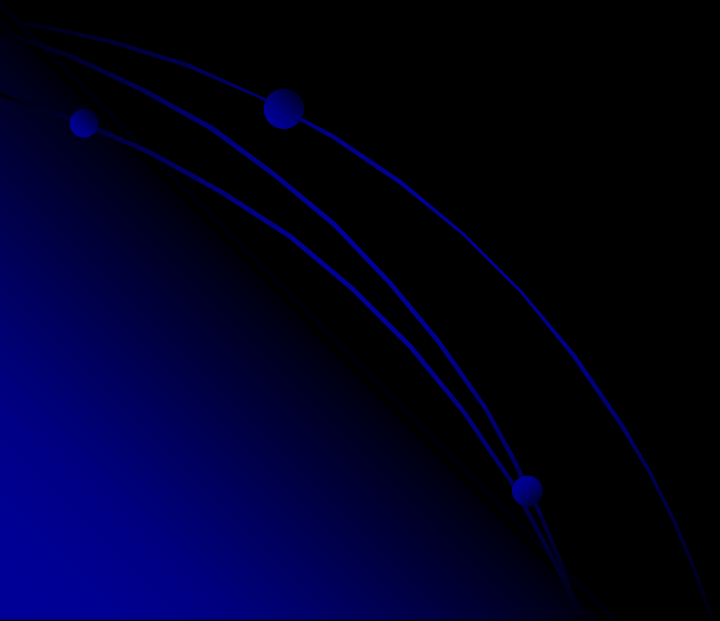
- *What are the advantages of this kind of approach?*

- *How does this kind of activity engage pupils?*



Our decision

We need to review our approach to the teaching and learning of mathematics to give sufficient encouragement to pupils to engage as active learners.



Collaborative Posters

Sam O'H +
Caz J

Quadratic Graph

$$y = x^2 - 4x - 12$$

$$\frac{dy}{dx} = 2x - 4$$

$$x = -4 \quad 2(-4) - 4 = -12$$

$$x = -2 \quad 2(-2) - 4 = -10$$

$$y = x^2 - 4x - 12$$

$$(x-6)(x+2)$$

$$x = 6 \quad x = -2$$

$$y = x^2 - 4x - 12$$

$$y = 0^2 - 4(0) - 12$$

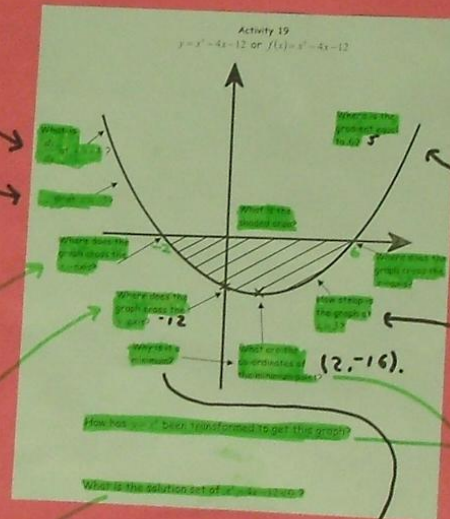
$$y = -12$$

$$(x-6)(x+2) < 0$$

$$x = +6 \quad x = -2$$

$$x = -2 < 6$$

$$-2 < x < 6$$



$$\int \frac{dy}{dx} = \frac{x^2}{3} - \frac{4x^2}{2} - \frac{12x}{1}$$

$$= \left[\frac{1}{3}x^3 - 2x^2 - 12x \right]_{-2}^6$$

$$\left(\frac{1}{3}(6)^3 - 2(6)^2 - 12(6) \right) - \left(\frac{1}{3}(-2)^3 - 2(-2)^2 - 12(-2) \right)$$

$$= -85.3 \text{ units}$$

$$\frac{dy}{dx} = 2x - 4 = 6$$

$$2x = 10$$

$$x = 5$$

$$\frac{dy}{dx} = 2(3) - 4 = 2$$

$$(x+a)^2 + (y-b)^2 = r^2$$

$$(x+2)(x-2)$$

$$(x-2)^2 - 12 = 0$$

$$(x-2)^2 = 16 \quad x^2 - 4x - 16 = 0$$

$$(x+8)(x-4)$$

$$\frac{dy}{dx} = 2x - 4$$

$$2x = 4$$

$$x = 2$$

$$\frac{1}{2} \quad \frac{2}{3}$$

$$\frac{1}{2} \quad \frac{2}{3}$$

$$\frac{1}{2} \quad \frac{2}{3}$$

* This is a min point because it is -ve then has a gradient of 0, then its +ve.

$$y = 2^2 - 4(2) - 12$$

$$y = -16$$

$$(2, -16)$$

$f(x) = x^3 - 3x^2 - 6x + 8$
 Constant term = 8
 Factors of 8: $\{1, -1, 4, -4, 2, -2, 8, -8\}$
 NB. Need new equation without $x+1$
 $f(1) = 1 - 4 + 5 - 2 = 0$
 $f(-1) = -1 - 4 + (-5) - 2 = -12$
 $f(2) = 8 - 12 + 10 - 2 = 0$
 $f(-2) = -8 - 12 + 12 + 8 = 0$
 $f(4) = 64 - 48 - 24 + 8 = 0$
 $f(-4) = -64 - 48 + 24 + 8 = -80$
 $f(8) = 512 - 192 - 48 + 8 = 380$
 $f(-8) = -512 - 192 + 48 + 8 = -656$
 $f(2) = 0$
 $\therefore (x-2)$ is a factor
 $\frac{x^3 - 3x^2 - 6x + 8}{x-2} = x^2 - x - 2$
 $\therefore y = (x-1)(x-2)^2$

Use technology in appropriate ways



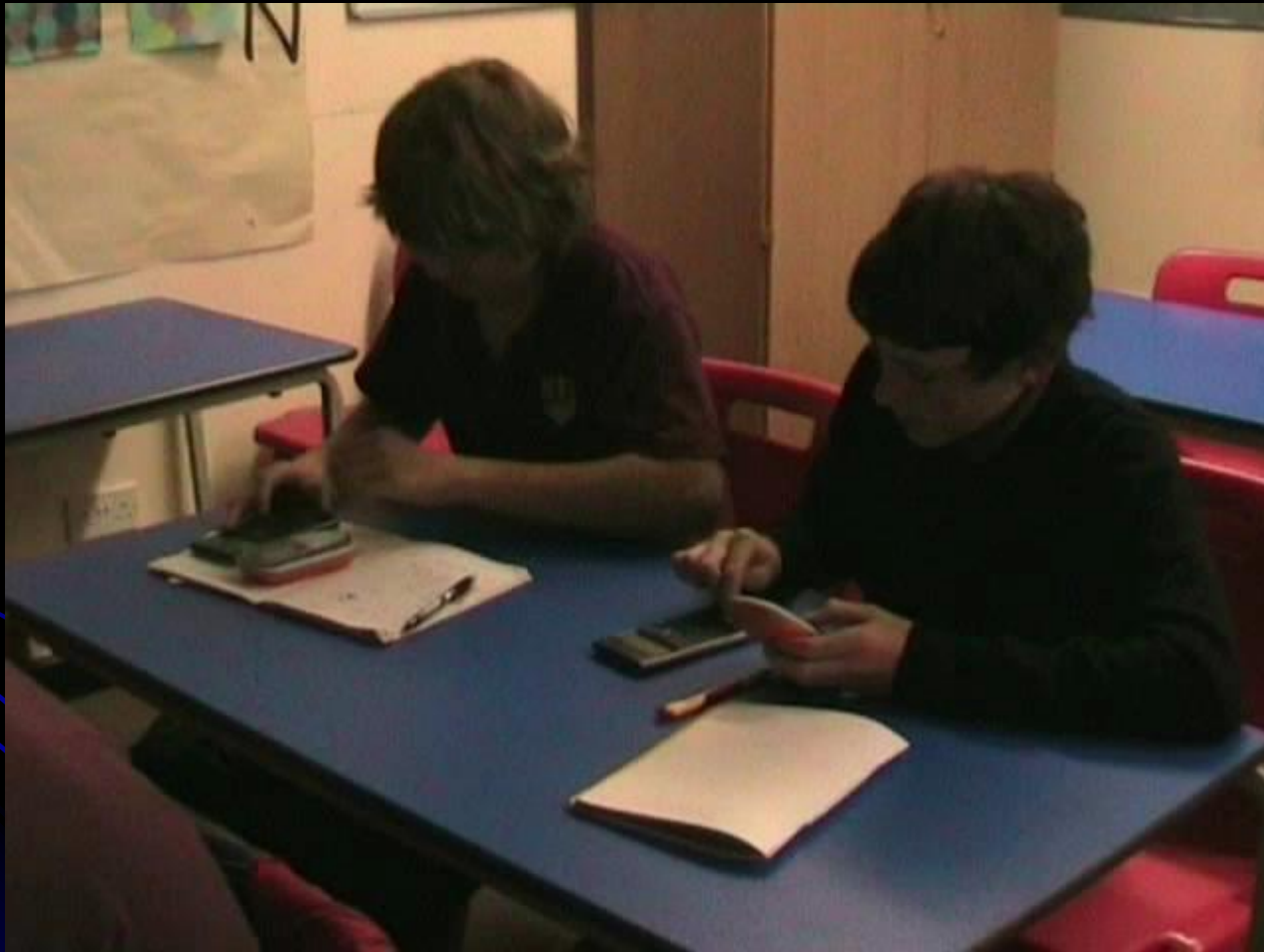
Solving problems - using cooperative small group work



Using rich collaborative tasks



Use technology in appropriate ways



Over to YOU!!

- Keep one eye on the video
- Tackle the maths

